



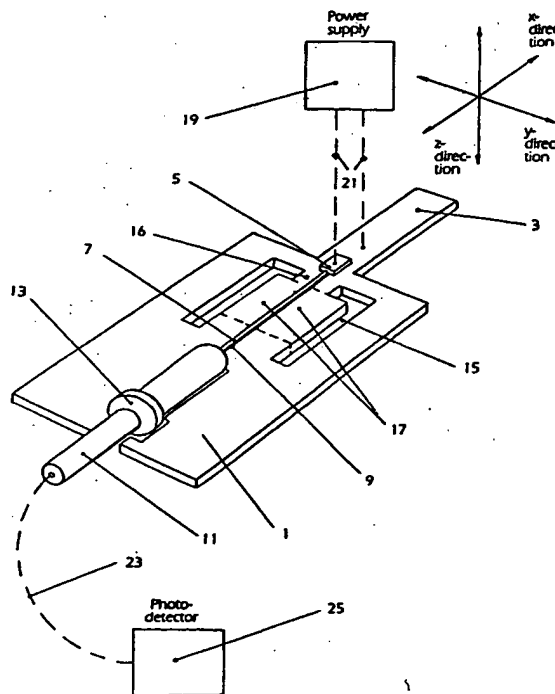
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|   |  |  |  |
|---|--|--|--|
| (51) International Patent Classification <sup>6</sup> :<br>G02B 6/42                                      |  | A3   | (11) International Publication Number: WO 98/58287               |
|   |  |  | (43) International Publication Date: 23 December 1998 (23.12.98) |
| (21) International Application Number: PCT/SE98/01177   |  | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). |  |
| (22) International Filing Date: 17 June 1998 (17.06.98)   |  |  |  |
| (30) Priority Data:<br>9702345-1 18 June 1997 (18.06.97) SE   |  |  |  |
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|   |  | Published<br>With international search report.<br>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.   |  |
|   |  | (88) Date of publication of the international search report:<br>11 March 1999 (11.03.99)   |  |

## (54) Title: ALIGNMENT OF OPTICAL BUILDING ELEMENTS

## (57) Abstract

When finely aligning an optical fiber (7), attached in groove (9) of a carrier (1), with a surface area of an optical element (5) such as a laser, the plate-shaped carrier is plastically deformed by having suitable tools displace or act on the carrier at the end of the fiber (7), within a deformation region (17). For facilitating the plastic deformation slots (15) are made around the deformation region (17), so that a weakened area (16) is obtained quite at the end surface of the fiber (7). The fine alignment can be made either for correcting the position of erroneously mounted optical building elements or for a fine alignment of building elements, which have been mounted without necessarily trying to achieve a very high accuracy. The very alignment procedure can be executed when simultaneously measuring the efficiency of the interface, by activating the laser (5) to emit light into the optical fiber (7). This light can be detected by a light detector (25), so that the deformation process can be made in order to obtain maximum output power at the end of the fiber (7). The material of the carrier (1) can be a metal having a high degree of purity, for example copper plate of a small thickness. The fine alignment procedure as described provides advantages both in economy and in the degree of accuracy in the alignment operation, so that little attenuation is obtained in the interface between the building elements in the finished product. The carrier together with the building elements is intended for being moulded into a capsule in order to obtain an optical component suited to be mounted on a circuit board.



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## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EDOC, WPIL, JAPIO

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                      | Relevant to claim No. |
|-----------|---|-----------------------|
| X         | WO 9106022 A1 (BT&D TECHNOLOGIES LIMITED), 2 May 1991 (02.05.91), see the whole document<br>--                          | 1-17                  |
| X         | EP 0717297 A2 (NORTHERN TELECOM LIMITED), 19 June 1996 (19.06.96), column 4, line 44 - line 59, figure 2<br>--<br>----- | 1-17                  |

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Date of the actual completion of the international search

7 January 1999

Date of mailing of the international search report

11-01-1999

Name and mailing address of the ISA/

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| Patent document<br>cited in search report |            | Publication<br>date | Patent family<br>member(s) |             | Publication<br>date |
|---|------------|---------------------|----------------------------|-------------|---------------------|
| WO  | 9106022 A1 | 02/05/91            | AU                         | 6602690 A   | 16/05/91            |
|   |            |                     | CA                         | 2066040 A   | 14/04/91            |
|   |            |                     | EP                         | 0495865 A   | 29/07/92            |
|   |            |                     | JP                         | 5501313 T   | 11/03/93            |
| EP  | 0717297 A2 | 19/06/96            | GB                         | 2296101 A,B | 19/06/96            |
|   |            |                     | GB                         | 9425022 D   | 00/00/00            |
|   |            |                     | US                         | 5570444 A   | 29/10/96            |